PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B66B 7/06, 11/04

A1

(11) International Publication Number: WO 96/09978

(43) International Publication Date: 4 April 1996 (04.04.96)

(21) International Application Number: PCT/FI95/00530

(22) International Filing Date: 27 September 1995 (27.09.95)

(30) Priority Data:
944475 27 September 1994 (27.09.94) FI

(71) Applicant *(for all designated States except US)*: KONE OY [FI/FI]; Munkkiniemen puistotie 25, FIN-00330 Helsinki (FI).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: MUSTALAHTI, Jorma [FI/FI]; Raivaajantie 13, FIN-05620 Hyvinkää (FI). AULANKO, Esko [FI/FI]; Käenkatu 6 C 33, FIN-04230 Kerava (FI). HAKALA, Harri [FI/FI]; Päiväläinkatu 15 A 2, FIN-05830 Hyvinkää (FI).

(74) Agent: KONE OY; Patent Dept., P.O. Box 677, FIN-05801 Hyvinkää (FI).

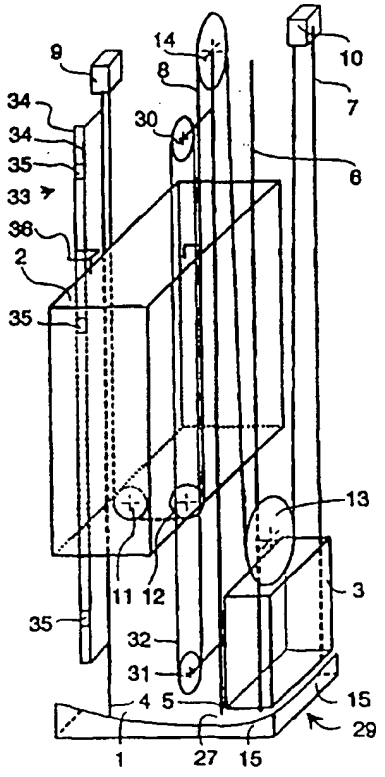
(81) Designated States: AM, AU, BB, BG, BR, BY, CA, CN, CZ, EE, FI, GE, HU, IS, JP, KG, KP, KR, KZ, LK, LR, LT, LV, MD, MG, MN, MX, NO, NZ, PL, RO, RU, SG, SI, SK, TJ, TM, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: ARRANGEMENT FOR FIXING AN ELEVATOR ROPE

(57) Abstract

According to the invention, at least one end of the elevator ropes (8) is fixed to a guide rail (4, 7) of the elevator. According to an embodiment of the invention, the whole elevator is so suspended by its ropes (8) that all vertical forces are transmitted by the guide rails (4...7) to the bottom (27) of the shaft (1). The invention provides the advantages that the elevator is easy to install and that the vertical forces are transmitted by the guide rails (4...7) to the bottom (27) of the shaft (1), permitting a lighter construction of shaft walls.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgystan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo			SE	Sweden
CH	Switzerland	KR	Republic of Korea	SI	Slovenia
CI	Côte d'Ivoire	KZ	Kazakhstan	SK	Slovakia
CM	Cameroon	LI	Liechtenstein	SN	Senegal
CN	China	LK	Sri Lanka	TD	Chad
CS	Czechoslovakia	LU	Luxembourg	TG	Togo
CZ	Czech Republic	LV	Latvia	TJ	Tajikistan
DE	Germany	MC	Monaco	TT	Trinidad and Tobago
DK	Denmark	MD	Republic of Moldova	UA	Ukraine
ES	Spain	MG	Madagascar	US	United States of America
FI	Finland	ML	Mali	UZ	Uzbekistan
FR	France	MN	Mongolia	VN	Viet Nam
GA	Gabon				

ARRANGEMENT FOR FIXING AN ELEVATOR ROPE

The present invention relates to an arrangement as defined in the preamble of claim 1 for fixing the elevator rope in an elevator and to an arrangement as defined in the preamble of claim 6 for the use of guide rails as supporting elements of an elevator and its equipment.

In traction sheave elevators, the ends of the elevator ropes are conventionally fixed to the elevator shaft or to anchorages in a machine room in the upper part of the elevator shaft. The other ends of the elevator ropes are usally fixed by means of springing elements. Similarly, the diverting pulleys of an elevator are typically mounted in the elevator shaft or in the machine room, but diverting pulleys mounted on an elevator guide rail are also known.

Previously known solutions for the fixing of elevator ropes have the drawback that the elevator ropes require a strong anchorage in the building and that the position of the anchorage in relation to the building, elevator, elevator shaft, elevator machinery and diverting pulleys must be closely defined. Therefore, fixing the elevator ropes by known techniques requires a long installation time because a holding element for a rope fixing element has to be installed first in the elevator shaft or machine room.

The object of the present invention is to produce a new arrangement for the fixing of elevator ropes, designed to facilitate the installation of elevator ropes and to reduce the installation time. Another object of the invention is to eliminate the need for mounting bases for elevator rope fixing elements mounted in the elevator shaft or in the machine room. A further object of the

invention is to avoid the transmission of vertical forces of the elevator ropes to the building or to the shaft walls.

To achieve the aims specified above, the arrangement of the invention for fixing an elevator rope is characterized by what is said in the characterization part of claim 1 and the arrangement for the use of guide rails as supporting elements of an elevator and its equipment is characterized by what is said in the characterization part of claim 3. Other features of the invention are presented in claim 2.

The invention has the advantage that the installation time and the total installation costs of the elevator are reduced. To achieve these advantages, the elevator guide rails are first fixed to the walls of the elevator shaft in a manner known in itself, e.g. to C-profile beams. Each end of the elevator rope is fixed to one of the guide rails. The guide rail ends can be provided with holes for the mounting of rope fixtures at the factory. The elevator machinery is mounted on one guide rail, and likewise a diverting pulley, so that all vertical forces of the elevator are transmitted via the guide rails to the bottom of the shaft. Therefore, the vertical forces impose no strain on the walls of the building. Thus, the exact position of the elevator is determined by the guide rails and the elevator imposes no vertical pressure on the building. As the elevator ropes are fixed to a guide rail, it follows that no mounting bases for rope fixing elements need to be installed, thus shortening the installation time.

The weight of elevator ropes fixed to a guide rail, that of the elevator car and counterweight supported by the ropes as well as the weight of an elevator machinery supported by a guide rail, in other words, almost all of the weight of the whole hoisting function is transmitted

by the guide rails to the bottom of the elevator shaft. The transmission of internal forces of the hoisting function through the shaft bottom or walls is avoided. An example of a disadvantageous solution avoided by the invention is an elevator in which the elevator ropes apply an upward pull to an elevator machinery mounted on the shaft bottom and to the shaft bottom itself. The invention also obviates the labor and costs resulting from anchoring the machinery in the building.

In the following, an embodiment of the invention is described by the aid of drawings, in which

Fig. 1 presents a diagrammatic view of an elevator with ropes mounted according to the invention,

Fig. 2 presents a rope fixing element in cross-section, and

Fig. 3 presents a rope fixing element in top view.

In Fig. 1, the elevator car 2 of an elevator 29 moves vertically along a first elevator guide rail 4 and a second elevator guide rail 5 mounted in an elevator shaft 1. The counterweight 3 also moves vertically along a first counterweight guide rail 6 and a second counterweight guide rail 7 mounted in the shaft. For the sake of readability of the illustration, the walls of the elevator shaft are not shown except for the bottom parts of two walls 15. The elevator 2 and the counterweight 3 are supported and moved by means of an elevator rope 8. The elevator rope 8 has two ends and consists of a number of parallel ropes (Fig. 3). The elevator machinery 14 is mounted on the top end of one 5 of the guide rails. The motor of the elevator machinery is a disc-type motor and the machinery is provided with a traction sheave. The elevator machinery is not described here in detail because

it is outside the scope of this invention. One of the two ends of the elevator rope is fixed to the top end of the first elevator guide rail 4 by means of a rope fixing element 9, from where the elevator rope is passed to the traction sheave of the elevator machinery 14 mounted on the top end of the second elevator guide rail 5. From here, the elevator rope is passed to the diverting pulley 13 of the counterweight 3 and then up to a second rope fixing element 10 mounted on the top end of the second counterweight guide rail 7, by means of which element 10 the other end of the elevator rope is fixed to the guide rail 7. This second rope fixing element 10 may be identical with the first rope fixing element 9 illustrated by Fig. 2, but it can also be implemented without using springing elements to fix the elevator ropes.

As the ropes and machinery of the elevator are mounted on the guide rails as described above, the vertical forces of the elevator are transmitted by the guide rails to the bottom 27 of the shaft 1.

Mounted on the guide rails are also known auxiliary pieces of eqipment, such as an overspeed governor 30, which is fixed to guide rail 5, and a device 33 for determining the elevator position, fixed to guide rail 4. The overspeed governor 30 comprises a closed rope loop 32, one end of which is passed around a diverting pulley 31 mounted it the lower part of guide rail 5. As is known, the overspeed governor causes the elevator to stop e.g. by means of a safety gear. The position indicating device 33 of the elevator comprises two thin ropes 34 fixed by their top and bottom ends to guide rail 4 by means of brackets. Fixed between the ropes 34 are metal plates 35 that indicate the elevator position as a sensing element 36 moving with the elevator 29 passes them.

Fig. 1 illustrates only one possible arrangement for fixing the elevator rope according to the invention. The elevator rope fixing arrangement of the invention can also

be implemented by fixing the elevator rope to one of the guide rails and the elevator machinery to the lower end of the other one.

Fig. 2 shows an elevator rope fixing element 9 sectioned in a vertical direction. The fixing element has a shape resembling a box with its front and top sides open. The frame of the fixing element consists of a bottom plate 20, a back plate 21 and two side plates 28 joined together. The bottom plate 20 is provided with a number of holes 26 corresponding to the number of elevator ropes, with a rope supporting element 22 passed through each hole. The rope supporting element 22 consists of a boltlike body 24 with a nut 23 and washer on its upper end. Between the washer and plate 20 is a springing element, preferably a helical spring 25. The lower end of the supporting element is provided with a conical hole in which a loop of the elevator rope 8 is formed, and the elevator rope is anchored in the conical hole by this loop by means of an expander bolt. Thus, each elevator rope is supported on the bottom plate 20 by a spring. Fixed with screws 19 to the back plate 21 are two mounting flanges 18, by which the whole fixing element 9 is attached to the guide rail 4 by means of other screws 17.

Fig. 3 presents the fixing element as seen from above. The guide rail 4 is fixed to the wall 15 of the elevator shaft by means of rail clips 16. The rail clips 16 permit vertical rail movement. Line A-A represents the section shown in Fig. 2.

It is obvious to a person skilled in the art that the embodiments of the invention are not restricted to the applications described, but that they may instead be varied in the scope of the following claims.

CLAIMS

1. Arrangement for fixing the elevator rope (8) in an elevator (29) comprising an elevator car (2), an elevator counterweight (3), elevator guide rails (4,5), counterweight guide rails (6,7), an elevator machinery (14), an elevator rope (8) having two ends at least one of which is fixed to one of the guide rails (4,5,6,7) of the elevator or counterweight, and at least one diverting pulley (11,12,13), by means of which the elevator car (2) is moved vertically in an elevator shaft (1), characterized in that the elevator rope (8) fixed to a guide rail (4) is driven by the elevator machinery (14) which is also mounted on one of the guide rails (5).

2. Arrangement for using a guide rail (4,5,6,7) as a supporting element of an elevator (29) comprising an elevator car (2), an elevator counterweight (3), elevator guide rails (4,5), counterweight guide rails (6,7), an elevator machinery (14), an elevator rope (8) and at least one diverting pulley (11,12,13), by means of which the elevator car (2) is moved vertically in an elevator shaft (1), and auxiliary equipment (30,33) of the elevator (2), characterized in that the elevator (2) together with its equipment is suspended on the guide rails (4,5,6,7) by fixing both ends of the elevator rope (8), the elevator machinery (14) and the auxliary equipment (30,33) of the elevator each to one of the guide rails (4,5,6,7) of the elevator (29) or counterweight (3).

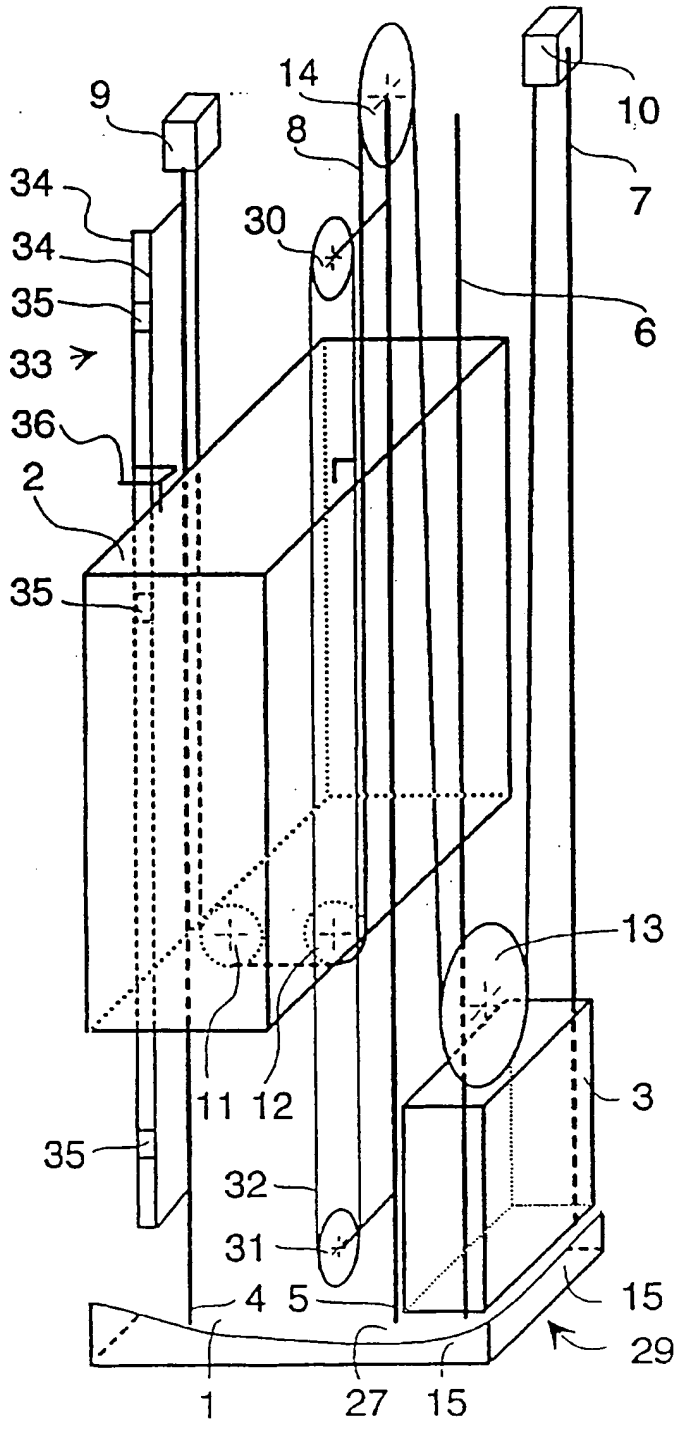


Fig. 1

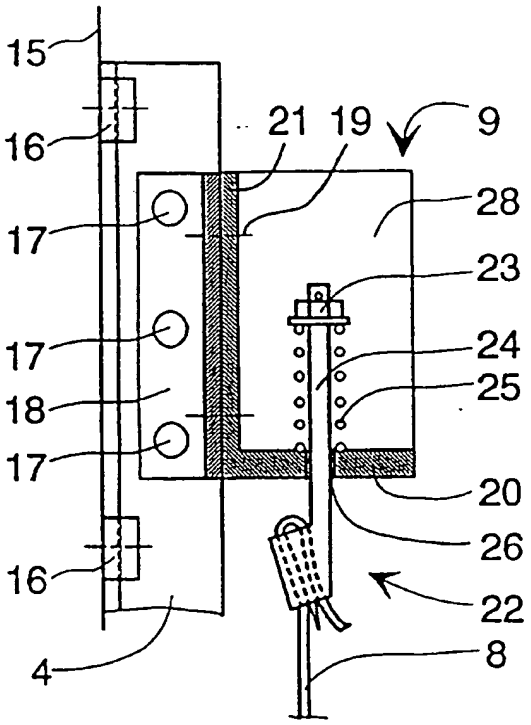

15
16
17
17
18
17
16
4
21
19
9
28
23
24
25
20
26
22
8

Fig. 2

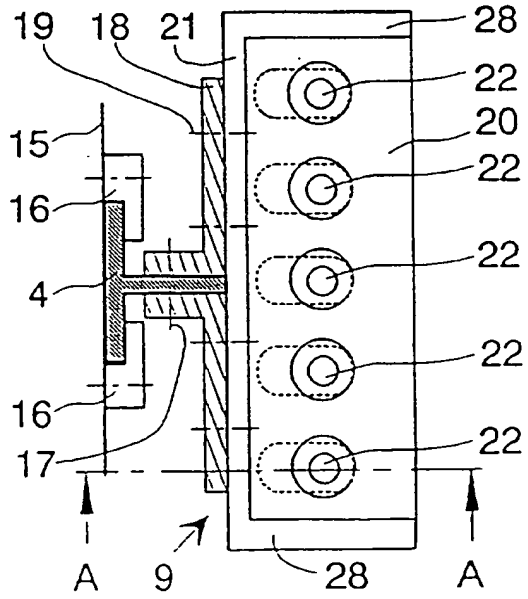

19
18
21
28
22
20
22
22
22
15
16
4
16
17
A
9
28
A

Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 95/00530

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B66B 7/06, B66B 11/04
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B66B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 2523345 C2 (ELEVATOR GMBH), 12 July 1984 (12.07.84), column 3 - column 4, figures 2,4	1-2

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 February 1996	28 -02- 1996
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Christer Bäcknert Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

05/02/96

International application No.
PCT/FI 95/00530

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-C2- 2523345	12/07/84	FR-A,B- 2275400	16/01/76
		SE-A- 7506063	01/12/75